

# Racial Demographics and U.S. GDP: 2017-2022

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The purpose of this presentation is to show difference  
GDP per capita change 2017-2022 in rural and urban  
areas and how it has been affected by Indian  
Subcontinent, Hispanic and African American populations.

## Classification Method

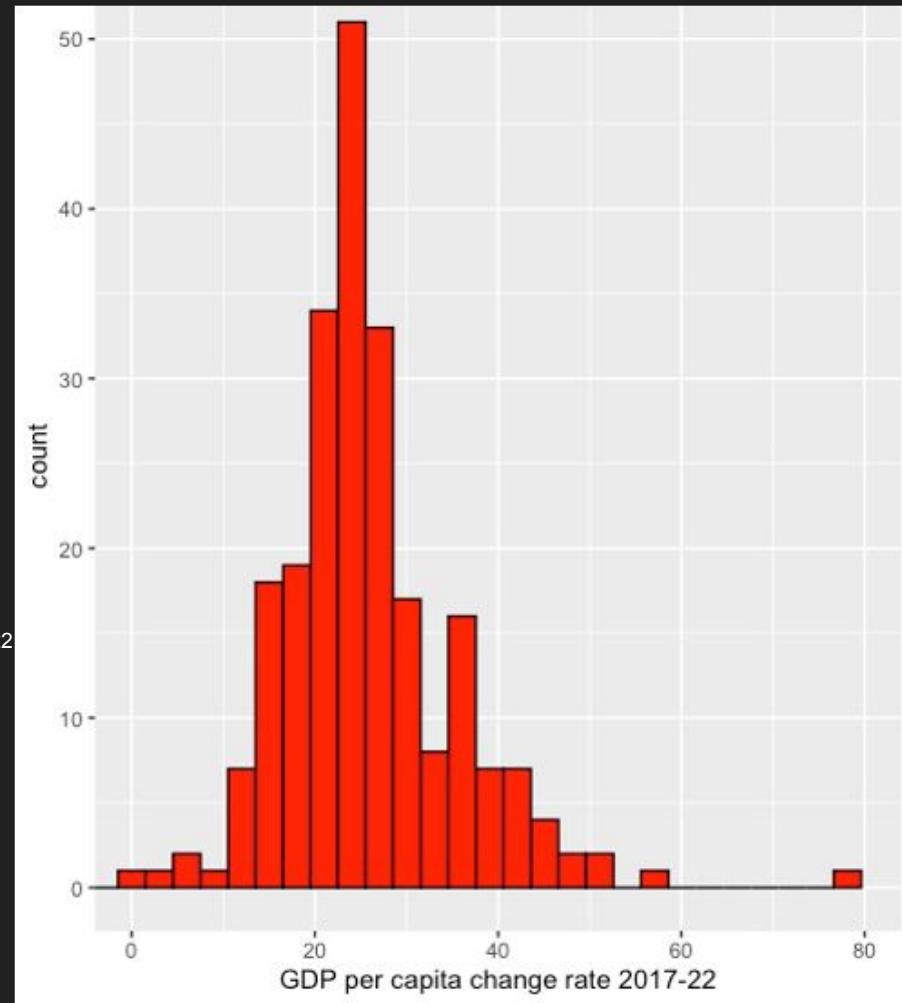
A county with a population over 50,000 is classified as metropolitan. Counties with populations between 10,000 and 50,000 are considered micropolitan, while those with fewer than 10,000 residents are deemed rural.

In the following slides, we excluded data that was missing and removed county data for which the population of the Indian subcontinent, African American, and Hispanic was interfering with the graph's clarity.

The histogram shows the distribution of GDP per capita change from 2017 to 2020 . The histogram shows the patterns of normal distribution and most of the data is centered around the mean,33.60101%

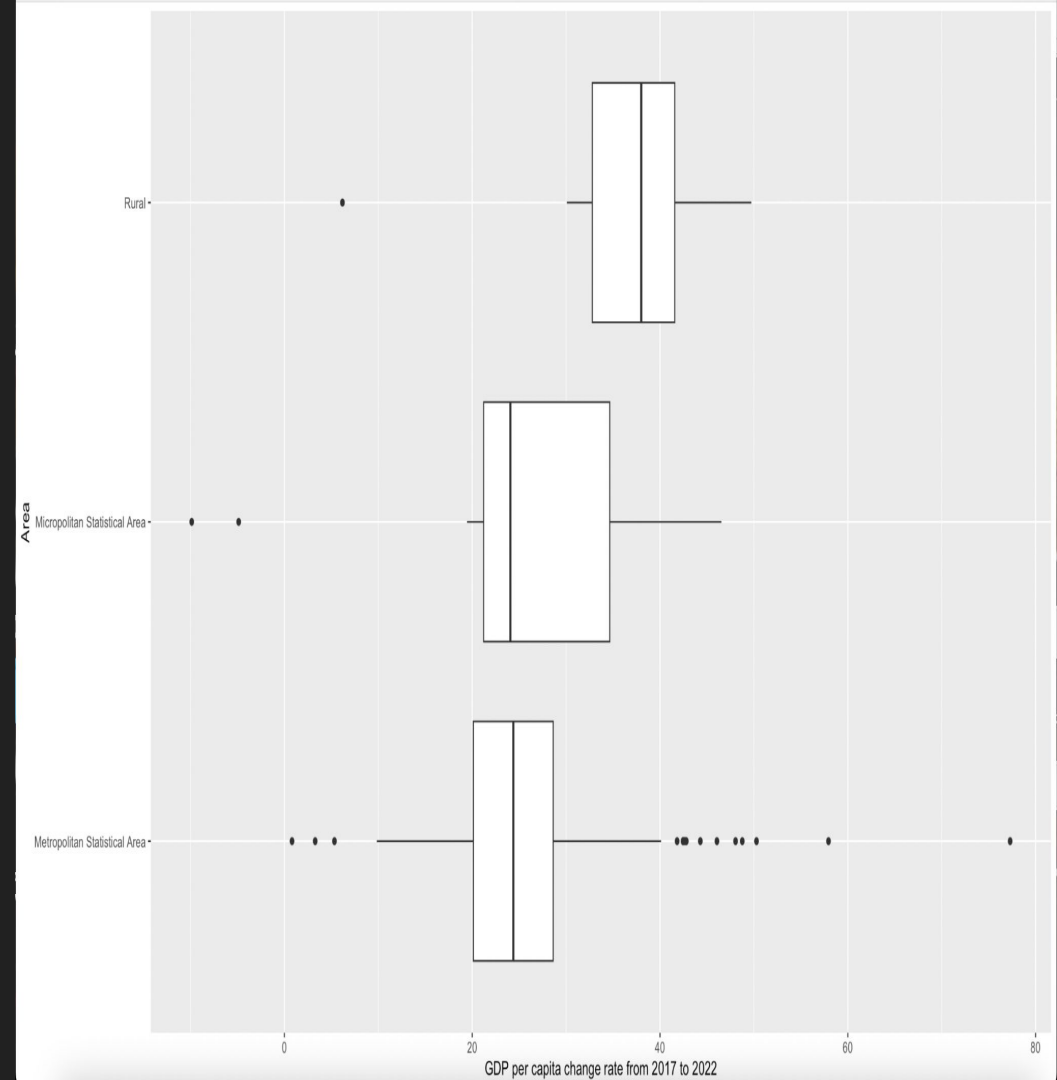
Top five counties with the most GDP per capita change rate

NAME	Area	GDP per capita change rate 2017-22
1 Stewart County, Georgia	Metropolitan Statistical Area	77.3
2 Whatcom County, Washington	Metropolitan Statistical Area	57.9
3 Solano County, California	Metropolitan Statistical Area	50.3
4 Jefferson County, Iowa	Rural	49.7
5 Mercer County, New Jersey	Metropolitan Statistical Area	48.8



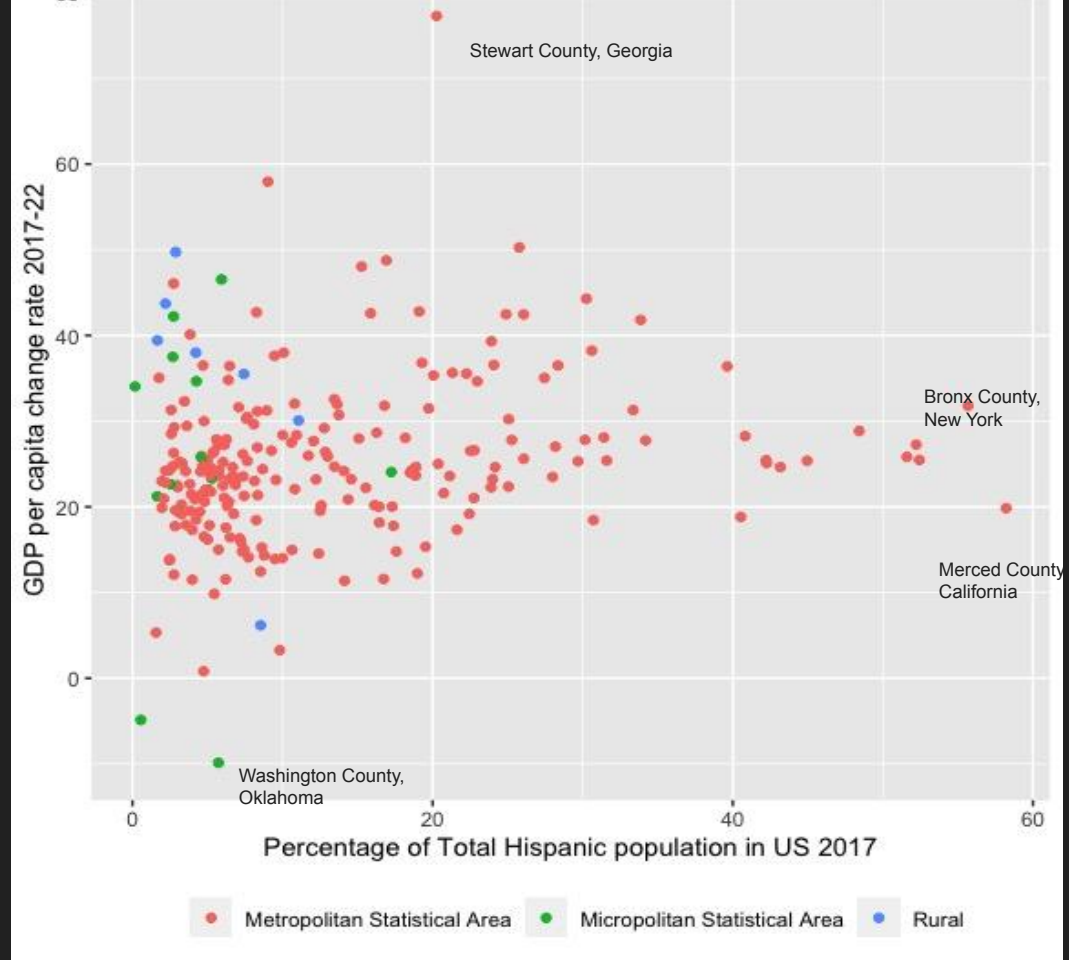
# Boxplot of GDP per capita change from 2017 to 2022

Area	Average GDP per capita
1 Metropolitan Statistical Area	25.3
2 Micropolitan Statistical Area	24.4
3 Rural	34.7



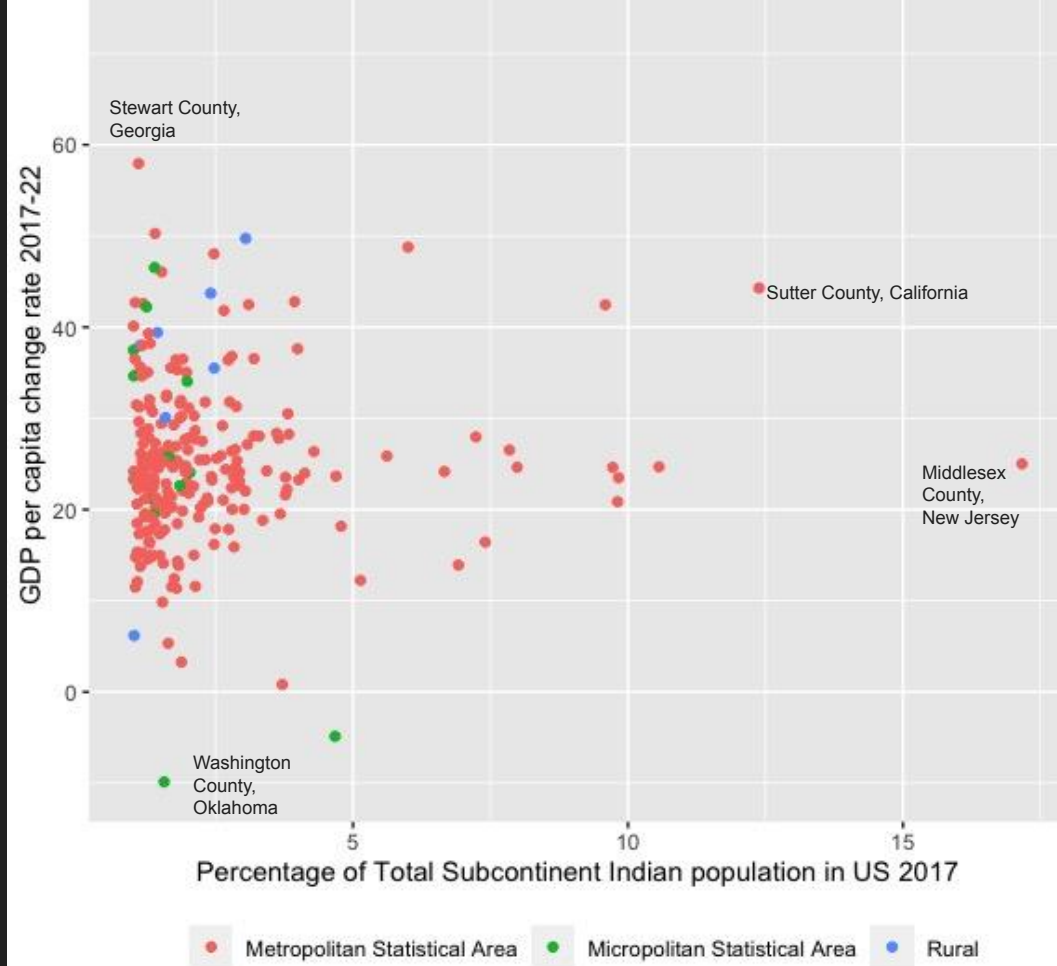
# Hispanics

The Y axis represents GDP per capita change rate 2017-2022, the X-axis represents percentage population of Total Hispanic population in US 2017 and the color represents the classification of the area. We can see an increasing trend as we move along the X-axis.



# Indian-Subcontinent

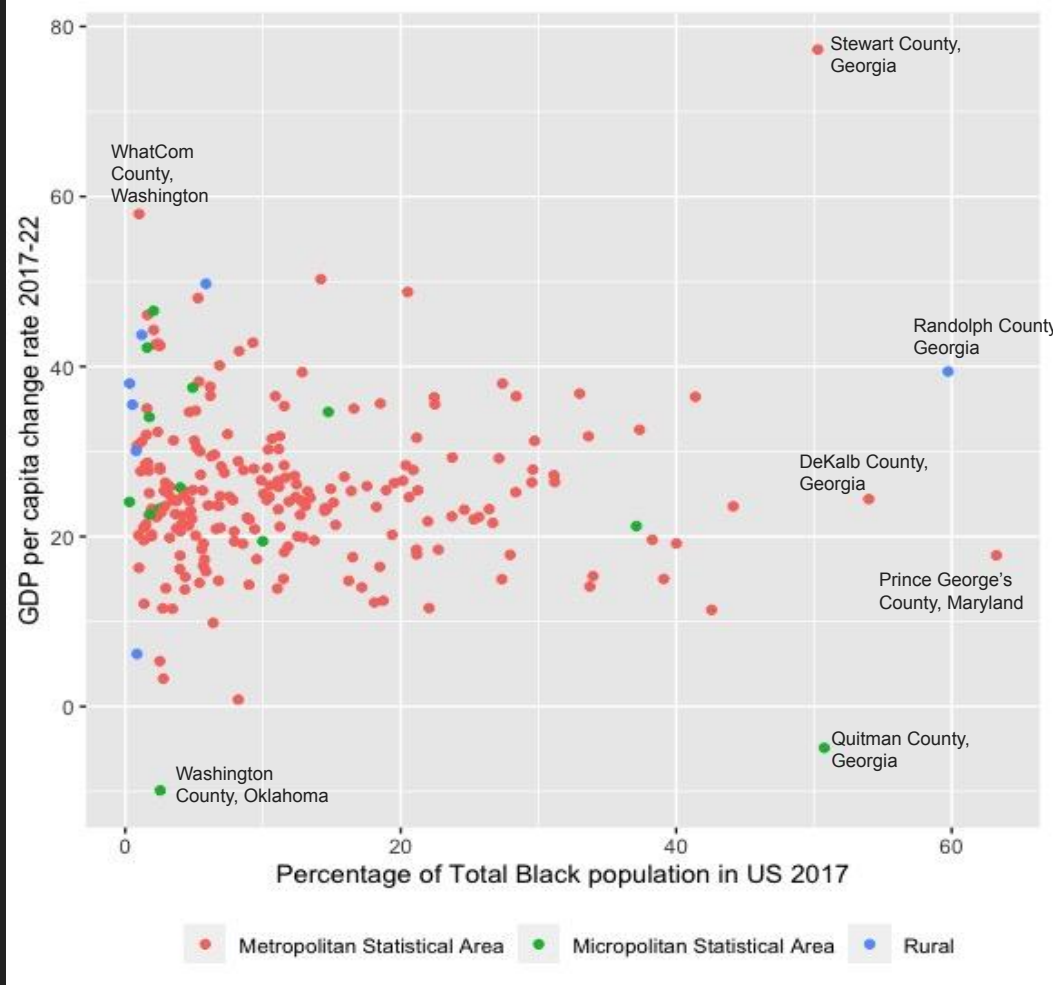
The Y axis represents GDP per capita change rate 2017-2022, the X-axis represents percentage population of Total Subcontinent Indians in US 2017 and the color represents the classification of the area. There is not a visible trend in the graph.

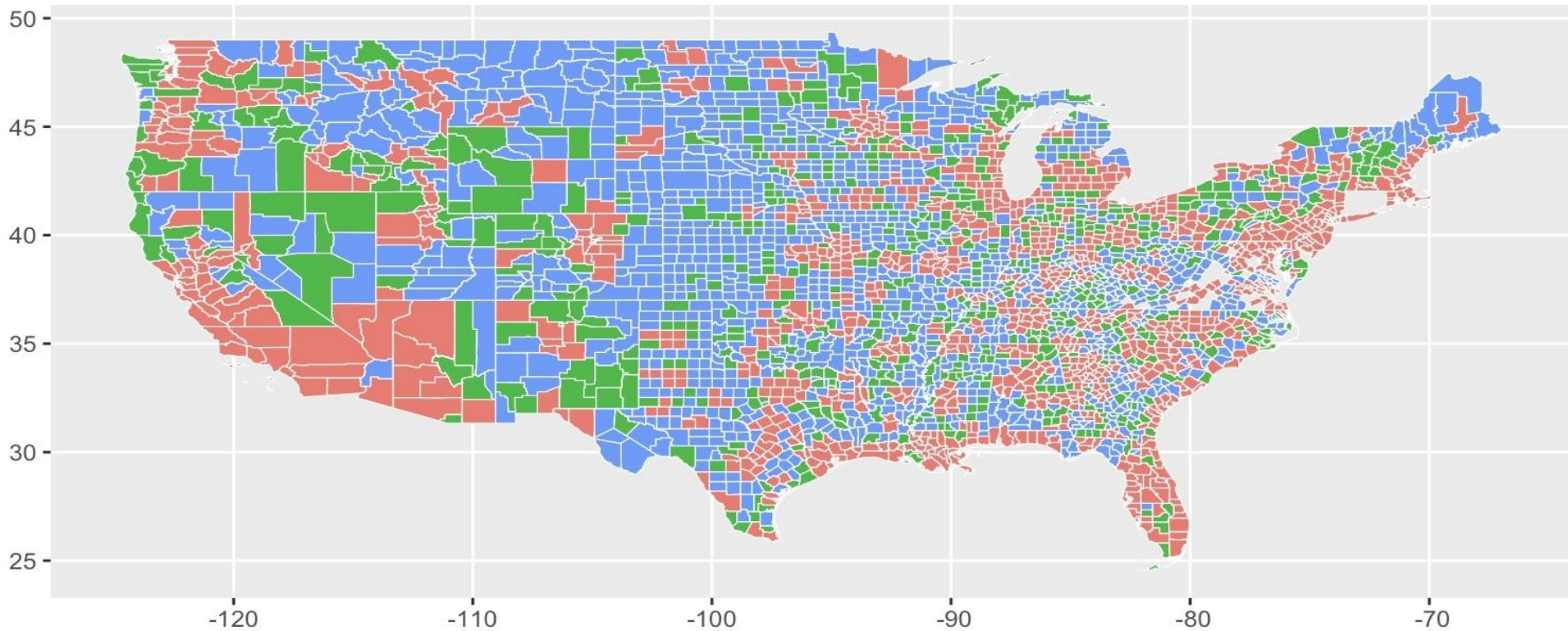




# African American

The Y axis represents GDP per capita change rate 2017-2022, the X-axis represents percentage population of Total Black population in US 2017 and the color represents the classification of the area. There is not a visible trend in the graph.





Metropolitan.Micropolitan.Statistical.Area



Metropolitan Statistical Area

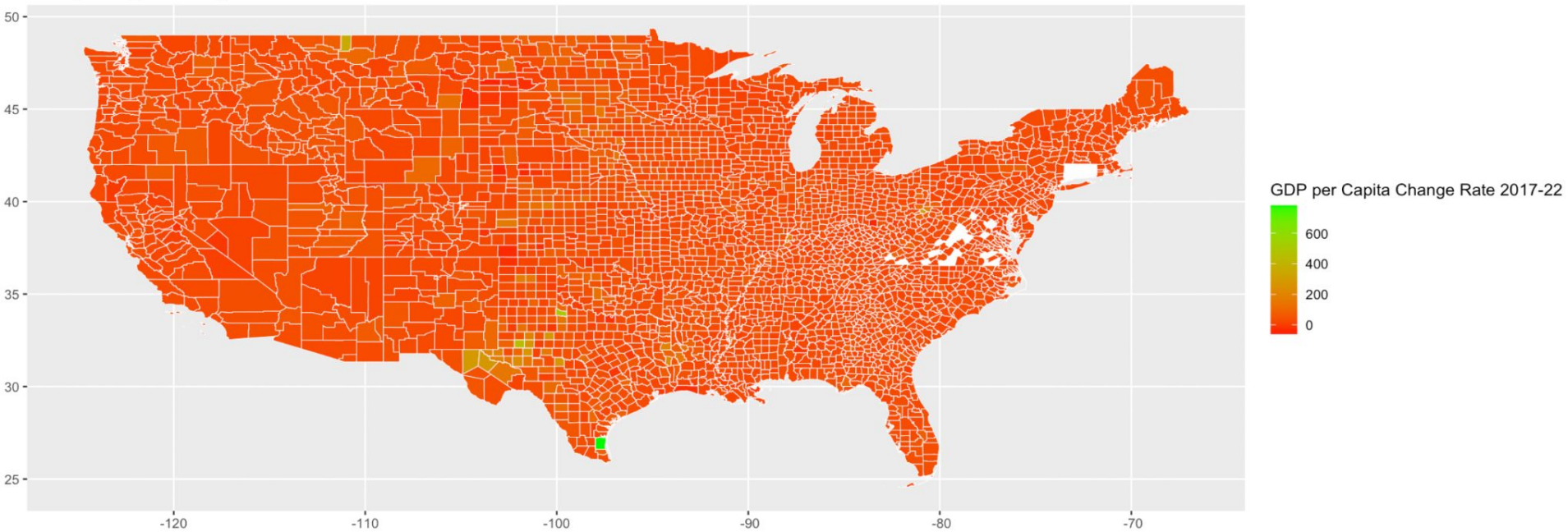


Micropolitan Statistical Area



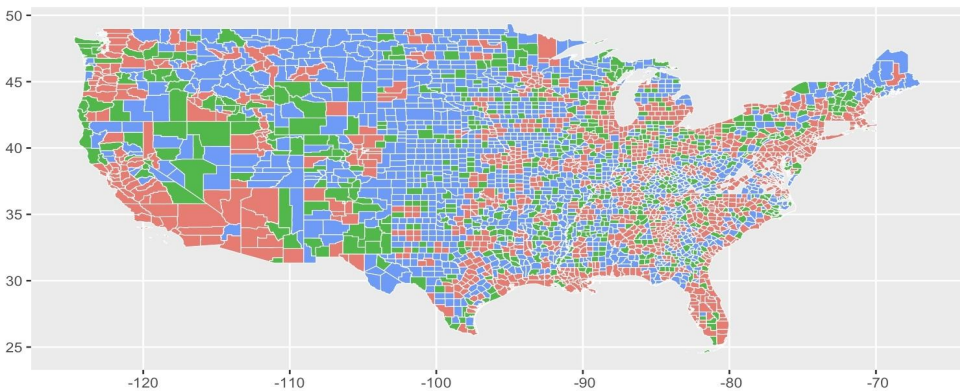
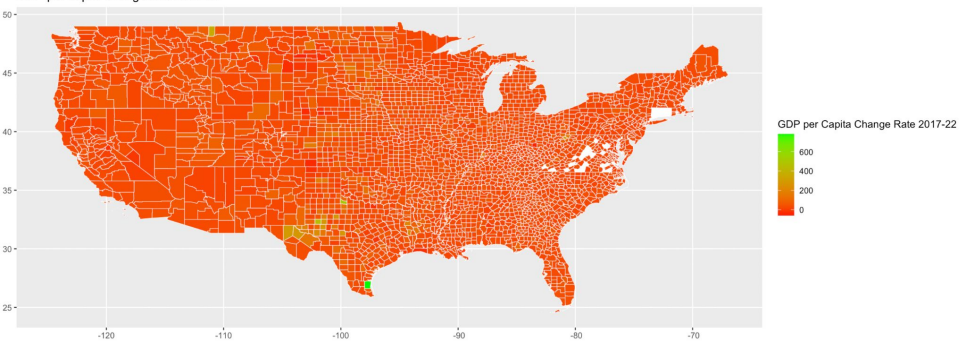
Rural

GDP per capita change rate 2017-22

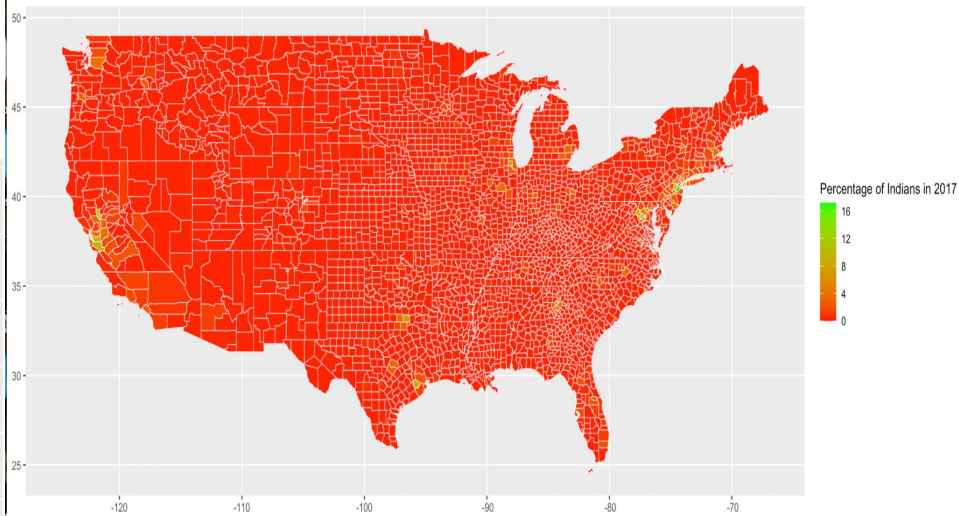


# Percentage of Subcontinent Indians in US 2017 Map

GDP per capita change rate 2017-22

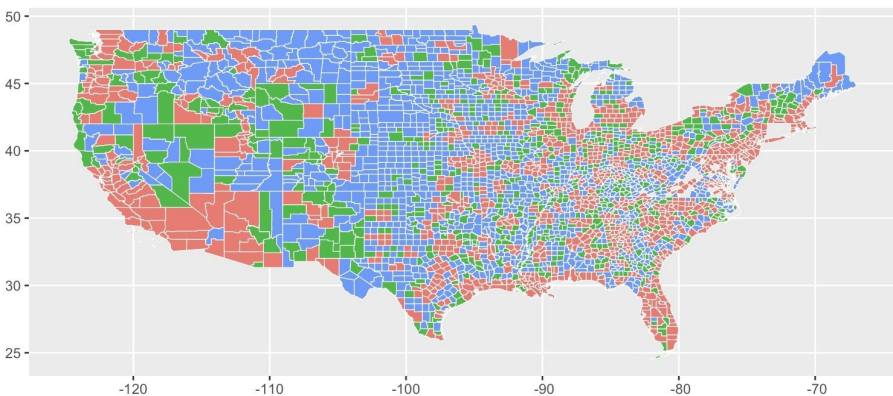
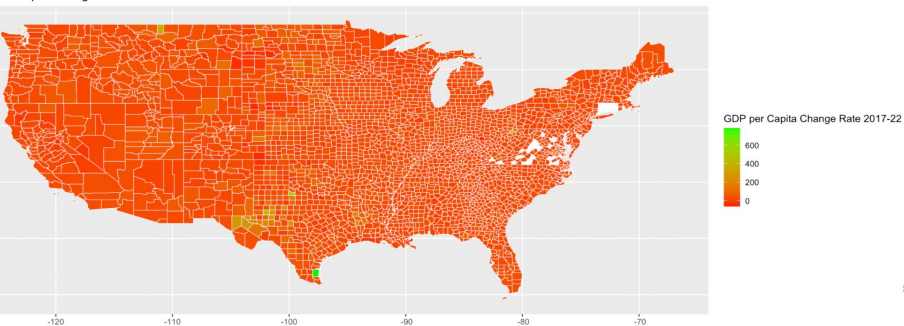


Metropolitan.Micropolitan.Statistical.Area    Metropolitan Statistical Area    Micropolitan Statistical Area    Rural



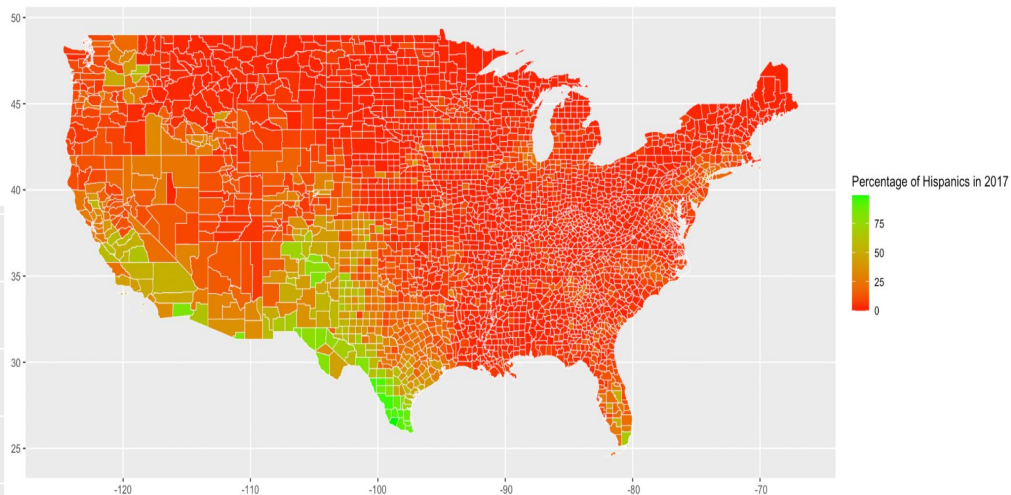


per capita change rate 2017-22

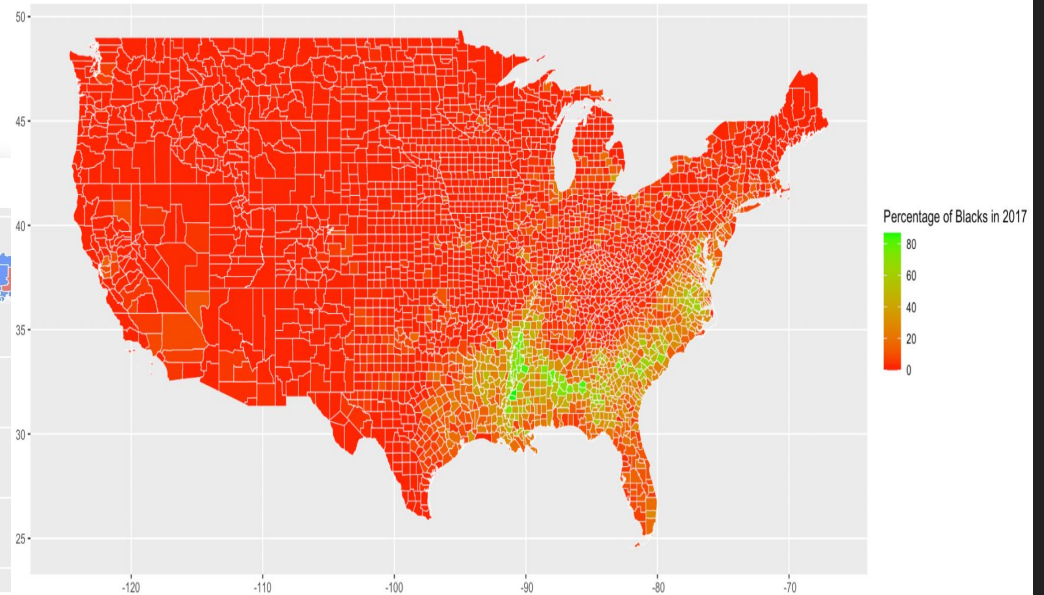
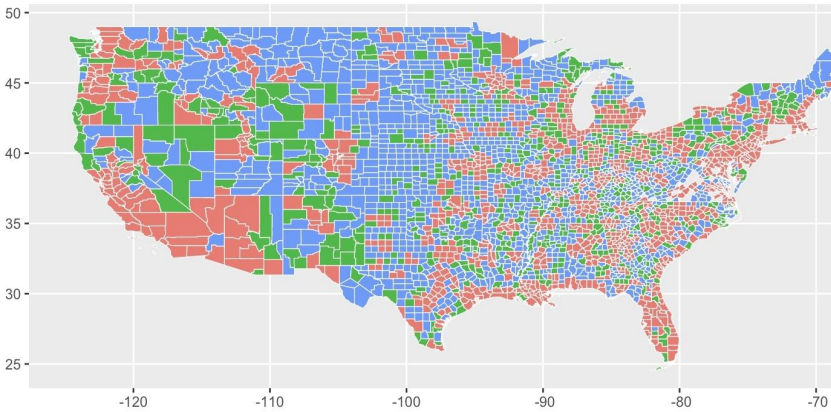
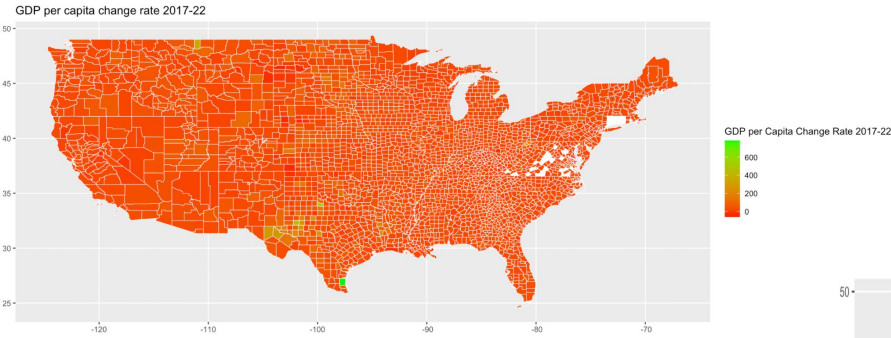


Metropolitan.Micropolitan.Statistical.Area    Metropolitan Statistical Area    Micropolitan Statistical Area    Rural

# Percentage of Hispanic in US 2017 Map



# Percentage of African American in US 2017 Map



# Linear Models

# Linear model of GDP per capita change rate 2017-2022 as function of percentage population of Total Subcontinent Indians in US 2017 and classification area

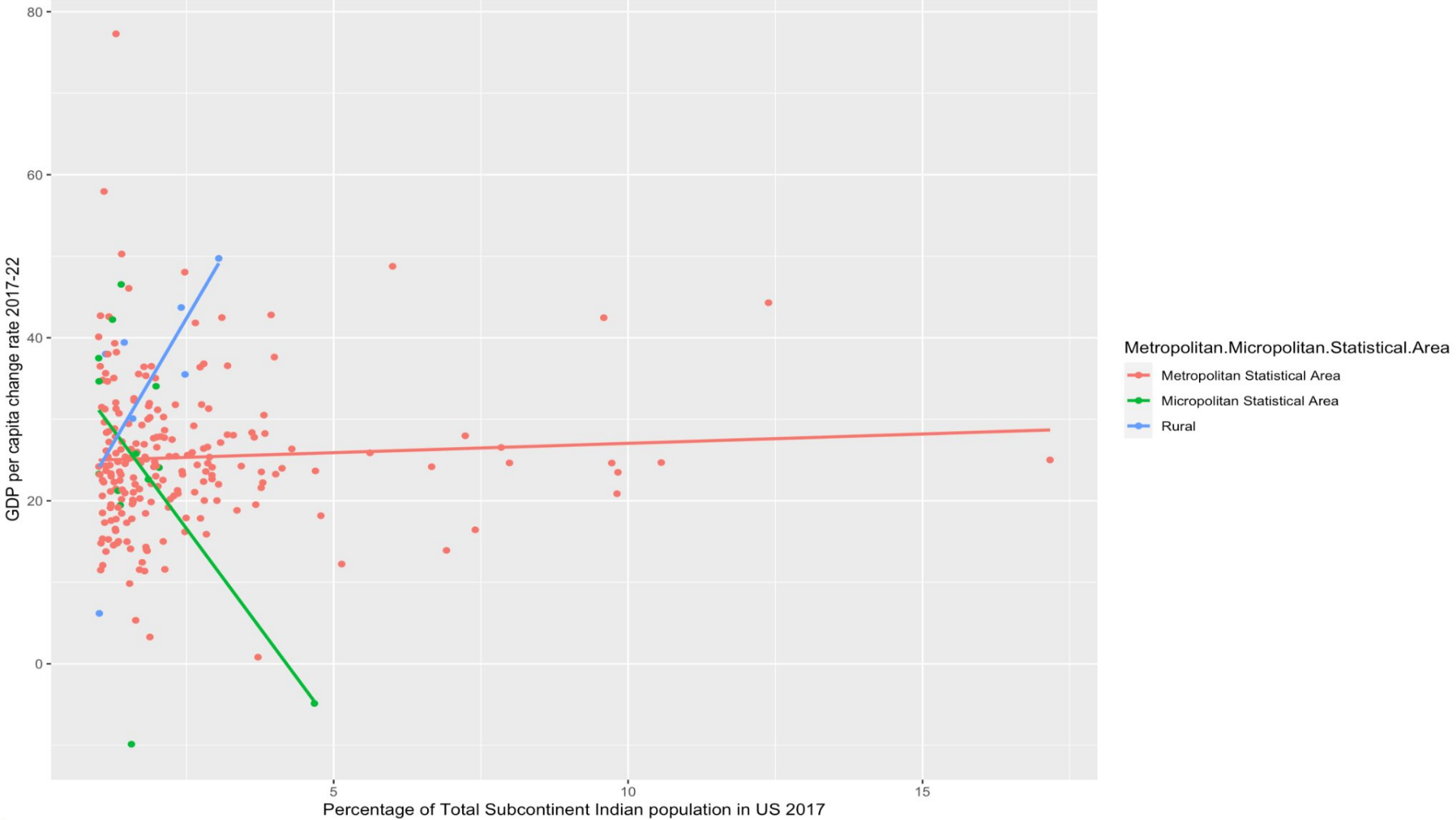
```
lm(formula = finaldata2$GDPpercapchangerate17_22 ~ finaldata2$percenttotalsubind17 *  
    finaldata2$Metropolitan.Micropolitan.Statistical.Area)
```

Coefficients:

	Estimate
(Intercept)	24.7526
Percentage of Indian population and Micropolitan Area combined effect	-9.9883
Percentage of Indian population and Rural Area combined effect	12.0958
	Pr(> t )
(Intercept)	< 2e-16
Percentage of Indian population and Micropolitan Area combined effect	0.00061
Percentage of Indian population and Rural Area combined effect	0.01684

Multiple R-squared: 0.09899,      Adjusted R-squared: 0.07924





The graph shows there is noticeable difference in the slope of Metropolitan Statistical Area and Micropolitan Area as well as the slope of Metropolitan Area and Rural Area for the percentage of indian population in 2017 and GDP per capita change from 2017 to 2022 is consistent with the linear model summary.

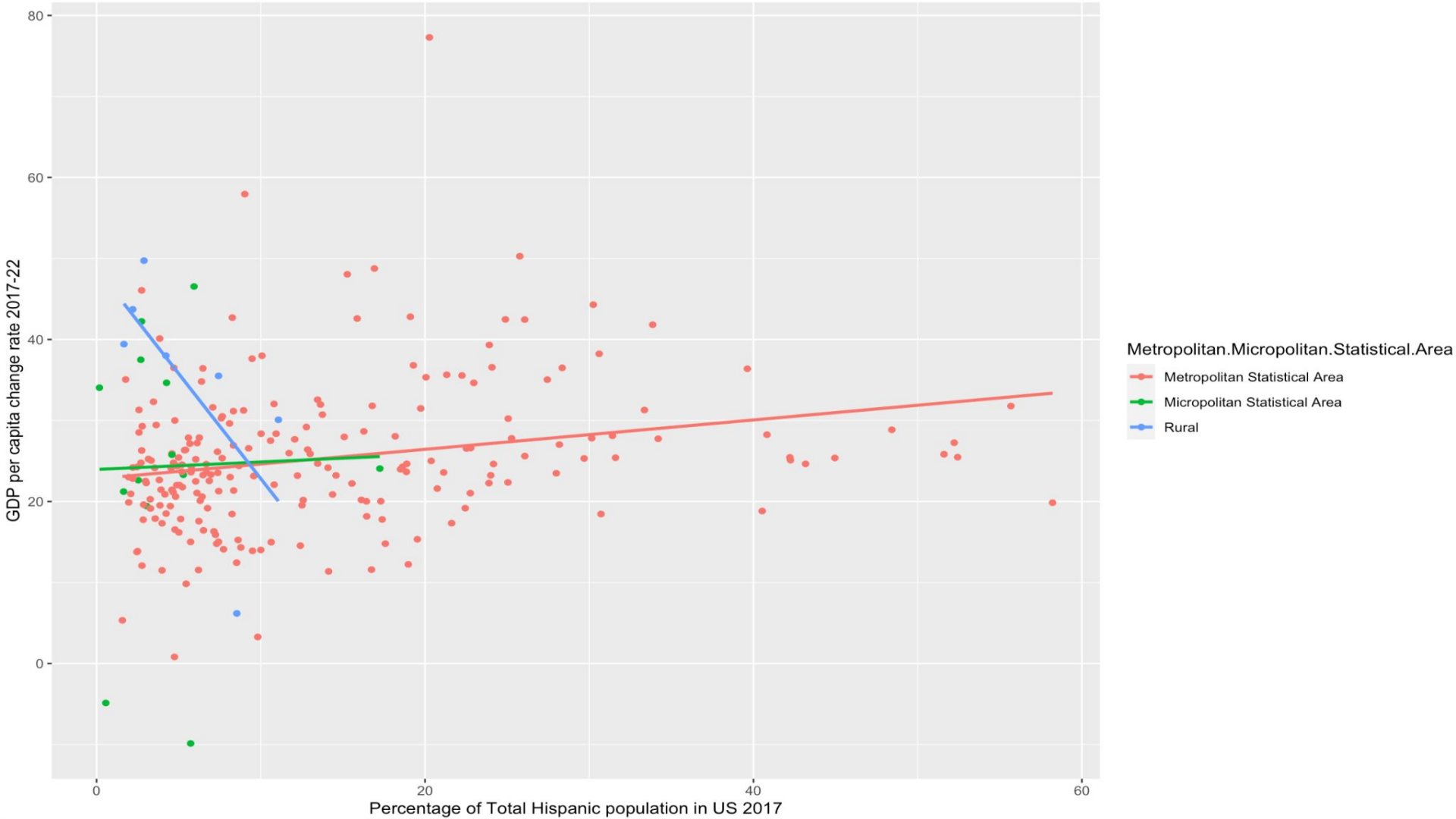
# Linear model of GDP per capita change rate 2017-2022 as function of percentage population of Total Hispanic in US 2017 and classification area

```
lm(formula = finaldata2$GDPpercapchangerate17_22 ~ finaldata2$percenttotalhisp17 *  
    finaldata2$Metropolitan.Micropolitan.Statistical.Area)
```

Coefficients:

(Intercept)	Estimate 22.80864
Percentage of Hispanic population and Micropolitan Area combined effect	-0.08920
Percentage of Hispanic population and Rural Area combined effect	-2.77426
	Pr(> t )
(Intercept)	< 2e-16
Percentage of Hispanic population and Micropolitan Area combined effect	0.889711
Percentage of Hispanic population and Rural Area combined effect	0.010792

Multiple R-squared: 0.09333,      Adjusted R-squared: 0.07345



The graph shows that there is not much difference in the slope of Metropolitan Statistical Area and Micropolitan Area for the percentage of Hispanic population in 2017 and GDP per capita change from 2017 to 2022 which is consistent with the linear model summary. The graph also shows that there is noticeable difference in the slope of Metropolitan Area and Rural Area for the percentage of Hispanic population in 2017 and GDP per capita change from 2017 to 2022 which is also consistent with the linear model summary.

# Linear model of GDP per capita change rate 2017-2022 as function of percentage population of Total African American people in US 2017 and classification area

Call:

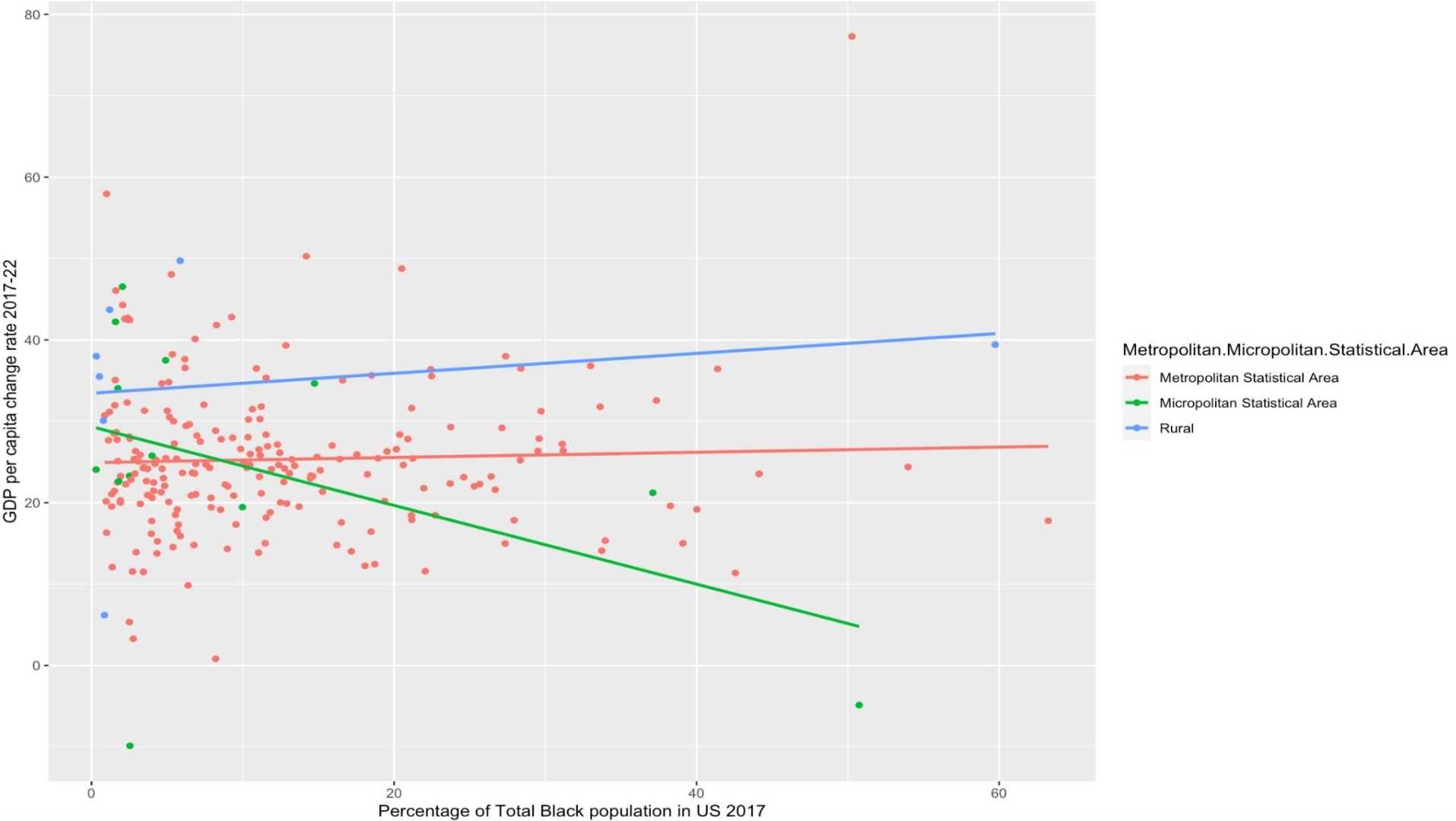
```
lm(formula = finaldata2$GDPpercapchangerate17_22 ~ finaldata2$percenttotalblack17 *  
    finaldata2$Metropolitan.Micropolitan.Statistical.Area)
```

Coefficients:

	Estimate
(Intercept)	24.92425
Percentage of Black population and Micropolitan Area combined effect	-0.51559
Percentage of Black population and Rural Area combined effect	0.09057

	Pr(> t )
(Intercept)	<2e-16
Percentage of Black population and Micropolitan Area combined effect	0.0066
Percentage of Black population and Rural Area combined effect	0.6323

Multiple R-squared: 0.06024,      Adjusted R-squared: 0.03963



The graph shows there is not much difference in the slope of Metropolitan Statistical Area and Rural Area for the percentage of Black population in 2017 and GDP per capita change from 2017 to 2022 is consistent with the linear model summary. The graph also shows there is noticeable difference in the slope of Metropolitan Area and Micropolitan Area for the percentage of Black population in 2017 and GDP per capita change from 2017 to 2022 which is also consistent with the linear model summary.



Anova Tests to test if difference in  
Average GDP per capita change  
rate 2017-2022 in different  
classifying areas significant

```
> summary(aov(dt$GDPpercapchangerate17_22 ~  
dt$Metropolitan.Micropolitan.Statistical.Area))
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
dt\$Metropolitan.Micropolitan.Statistical.Area	2	79021	39511	40.46	<2e-16 ***
Residuals	3046	2974475	977		

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

92 observations deleted due to missingness

# Correlations

1. GDP per capita change rate from 2017 to 2022 and Percentage of Indian population in 2017 : 0.02738132
2. GDP per capita change rate from 2017 to 2022 and Percentage of Hispanic population in 2017 : 0.1811168
3. GDP per capita change rate from 2017 to 2022 and Percentage of African American population in 2017 : -0.01343505

# Conclusions

- Out of the three races , Hispanic population has the most positive impact on GDP per capita change rate 2017-2022
- The difference in Average GDP per capita change rate 2017-2022 in different classifying areas is significant

# Citations:

Bureau of Economic Analysis. "BEA Regional Data." U.S. Department of Commerce,

[https://apps.bea.gov/regional/downloadzip.cfm?\\_gl=1\\*dwaf9w\\*\\_ga\\*NjYzMzgwMDA0LjE3MDI0MzU3NzU.\\*\\_ga\\_J4698JNNFT\\*MTcwMjQ0MjYzOC4yLjEuMTcwMjQ0NTQ4OS4wLjAuMA](https://apps.bea.gov/regional/downloadzip.cfm?_gl=1*dwaf9w*_ga*NjYzMzgwMDA0LjE3MDI0MzU3NzU.*_ga_J4698JNNFT*MTcwMjQ0MjYzOC4yLjEuMTcwMjQ0NTQ4OS4wLjAuMA)

Equitable Growth. "Gaps in U.S. Rural and Urban Economic Growth Widened in the Post-Great Recession Economy, With Implications Amid the Coronavirus Recession." Washington Center for Equitable Growth,

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U.S. Census Bureau. "Asian Population and Partners." <https://www.census.gov/about/partners/cic/resources/data-links/asian.html>.

<https://headwaterseconomics.org/economic-development/trends-performance/hispanic-populations/>

[https://en.wikipedia.org/wiki/Black\\_Southerners#:~:text=Since%20the%20second%20Great%20Migration,Virginia%2C%20Tennessee%2C%20and%20Florida.](https://en.wikipedia.org/wiki/Black_Southerners#:~:text=Since%20the%20second%20Great%20Migration,Virginia%2C%20Tennessee%2C%20and%20Florida.)

<https://www.hhs.gov/guidance/document/defining-rural-population#:~:text=All%20counties%20that%20are%20not.as%20either%20Metro%20or%20Micro.>